CLAIMS

1. An optical cross-connect (OXC) for use in a wavelength division multiplex (WDM) comprising: a plurality of optical inputs for receiving respective WDM communication bearing radiation; a plurality of optical outputs for outputting respective WDM communication bearing radiation switched by the OXC; a single stage optical switching matrix for switching WDM radiation between the optical inputs and outputs, wherein the optical switching matrix comprises a respective switching matrix for each wavelength channel of the WDM radiation; and a further plurality of optical inputs and outputs for respectively adding and dropping selected wavelength channels, the OXC being characterised by a respective multi-stage optical switching matrix for selectively connecting the further plurality of optical inputs and outputs to inputs and outputs of the single stage switching matrix.

2. An OXC according to Claim 1, in which the multistage switching matrix comprises a multi-stage Clos network in which the single stage switching matrix comprises one stage of the Clos network.

3. An optical cross-connect (OXC) comprising:

a plurality (N x M) of input channels (i1 to iM) for through traffic;

a plurality (N x M) of output channels (o1 to oM) for through traffic;

a first group of optical switching matrices (S1-1 to S1-N) for connecting each through traffic input channel (i1 to iM) to any of the through traffic output channels (o1 to oM), wherein each through traffic input channel (i1 to iM) is connected to an input of a switching matrix (S1-1 to S1-N) of the first group and each through traffic output channel

(o1 to oM) is connected to an output of the switching matrix (S1-1 to S1-N) of the first group;

a third plurality (P) of input channels (a1 to aP) for adding traffic,

characterised by each add traffic input channel (a1 to aP) being connected to an input of a second group of switching matrices (S2-1 to S2-AD; S2'-1 to S2'-AD), wherein outputs of the second group of switching matrices are connected to inputs of a third group of switching matrices (S3-1 to S3-2M-1) and outputs of the third group of switching matrices are connected to inputs of the first group of switching matrices such that the switching matrices of the second, third and first groups form a Clos network.

4. An OXC according to Claim 3, and further comprising a plurality of de-multiplexers (D1 to DM), each of which has an input for connection to an optical input (I1 to IM) which carries WDM radiation comprising a plurality (N) of wavelength channels and a plurality (N) of outputs for outputting one of these wavelength channels to one of the through traffic input channels (i1 to iM).

5. An OXC according to Claim 4, in which each de-multiplexer (D1 to DM) is connected to each switching matrix (S1-1 to S1-N) of the first group by one input channel (i1 to iM).

6. An OXC according to Claim 4 or Claim 5, in which the de-multiplexers (D1 to DM) are wavelength de-multiplexers outputting a wavelength channels to an output defined according to the carrier wavelength (λ1 to λN) of the wavelength channel, and the outputs of various de-multiplexers (D1 to DM) for outputting wavelength channels of a

same carrier wavelength are connected to a same switching matrix (S1-1 to S1-N) of the first group.

7. An OXC according to any one Claims 3 to 6, wherein each switching matrix (S2-1 to S2-AD; S2'-1 to S2'-AD) of the second group has a number M of inputs for adding traffic and a number of at least 2M-1, preferably exactly 2M-1, outputs connected to inputs of switching matrices of the third group (S3-1 to S3-(2M-1)).

8. An OXC according to any one of Claims 3 to 7, wherein each optical switching matrix (S1-1 to S1-N) of the first group has a number M of outputs for through traffic and a number of at least 2M-1, preferably exactly 2M-1, inputs connected to outputs of switching matrices of the third group.

9. An optical cross-connect (OXC) comprising:

a plurality (N x M) of input channels (i1 to iM) for through traffic;

a plurality (N x M) of output channels (o1 to oM) for through traffic;

a first group of optical switching matrices (S1-1 to S1-N) for connecting each through traffic input channel (i1 to iM) with any of the through traffic output channels (o1 to oM), wherein each through traffic input channel (i1 to iM) is connected to an input of a switching matrix (S1-1 to S1-N) of the first group, and each through traffic output channel (o1 to oM) is connected to an output of a switching matrix (S1-1 to S1-N) of the first group;

a plurality (P) of output channels for dropping traffic,

characterised in that each drop traffic output channel is connected to an output of a fifth group of switching matrices (S5-1 to S5-AD; S2'-1 to S2'-AD), wherein inputs of the fifth group of switching matrices(S5-1 to S5-AD; S2'-1 to S2'-AD) are connected to outputs of a fourth group of switching matrices (S4-1 to S4-2M-1) and inputs of the fourth group of switching matrices are connected to outputs of the first group of switching matrices such that the switching matrices of the first, fourth and fifth groups form a Clos network.

10. An OXC according to Claim 9, and further comprising a plurality (M) of multiplexers (M1 to MM), each of which has an output for connecting to an optical output (O1 to OM) which carries WDM radiation comprising a plurality (N) of wavelength channels, and a plurality of inputs for inputting one of these wavelength channels from one of the through traffic output channels (o1 to oM).

11. An OXC according to Claim 10, in which each multiplexer (M1 to MM) is connected to each switching matrix (S1-1to S1-N) of the first group by one output channel (o1 to oM).

12. An OXC according to any one of Claims 9 to 11, in which each optical switching matrix (S5-1 to S5-AD; S2'-1 to S2'-AD) of the fifth group has a number M of outputs for dropping traffic and a number of at least 2M-1, preferably exactly 2M-1, inputs connected to outputs of switching matrices of the fourth group (S4-1 to S4-(2M-1)).

13. An OXC according to any one of Claims 9 to 12, in which each optical switching matrix (S1-1 to S1-N) of the first group has a number M of inputs for through traffic and a

number of at least 2M-1, preferably exactly 2M-1, outputs (oM+1 to o3M-1) connected to inputs of switching matrices of the fourth group (S4-1 to S4-(2M-1)).

14. An OXC according to any one of Claims 2 to 8 and any one of Claims 9 to 13, in which the second group of optical switching matrices and the fifth group of optical switching matrices (S2'-1 to S2'-AD) are identical.